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CLAIMS

What is claimed is:

1. A method, comprising:

designing a TEQ (Time EQualizer) in a DMT (Discrete Multi-Tone) system to improve throughput performance; and

reducing the number and severity of notches that the TEQ introduces in a transfer function of a shortened main channel in the DMT system.

2. The method of claim 1, wherein designing the TEQ comprises

selecting an eigenvector with a subspace-based design method; and

computing TEQ filter coefficients with the eigenvector.

3. The method of claim 2, wherein designing the TEQ further comprises using a MSSNR (Maximum Shortening Signal-to-Noise Ratio) method.

4. The method of claim 2, wherein designing the TEQ further comprises using a MinISI (Minimum Inter-Symbol Interference) method.

5. The method of claim 2, wherein the eigenvector used to compute the TEQ filter coefficients does not correspond to a maximum eigenvalue.

6. The method of claim 2, wherein selecting the eigenvector comprises maximizing the achievable bitrate over a subspace of eigenvectors.

7. The method of claim 6, wherein the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of eigenvalues that are comparable in magnitude to a maximum eigenvalue.

8. The method of claim 1, wherein the TEQ design is used in a multiline communications system having multiple twisted copper pairs as a single multiline communications channel, and physical-layer signals coordinated across multiple transmitters and/or across multiple receivers for the purpose of minimizing interference

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noise from external sources, such as crosstalk noise from other high-bitrate services operating in a common binder or adjacent binders.

9. The method of claim 8, wherein designing the TEQ comprises
selecting an eigenvector with a subspace-based design method; and
computing TEQ filter coefficients with the eigenvector.

10. The method of claim 8, wherein designing the TEQ further comprises using a MSSNR (Maximum Shortening Signal-to-Noise Ratio) method.

11. The method of claim 8, wherein designing the TEQ further comprises using a MinISI (Minimum Inter-Symbol Interference) method.

12. The method of claim 8, wherein the eigenvector used to compute the TEQ filter coefficients does not correspond to a maximum eigenvalue.

13. The method of claim 8, wherein selecting the eigenvector comprises maximizing the achievable bitrate over a subspace of eigenvectors.

14. The method of claim 13, wherein the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of eigenvalues that are comparable in magnitude to a maximum eigenvalue.

15. A system, comprising:

means for designing a TEQ (Time EQualizer) in a DMT (Discrete Multi-Tone) system to improve throughput performance; and

means for reducing the number and severity of notches that the TEQ introduces in a transfer function of a shortened main channel in the DMT system.

16. The system of claim 15, wherein the means for designing the TEQ comprises
means for selecting an eigenvector with a subspace-based design system; and
means for computing TEQ filter coefficients with the eigenvector.

17. The system of claim 16, wherein the means for designing the TEQ further comprises means for using a MSSNR (Maximum Shortening Signal-to-Noise Ratio) system.

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18. The system of claim 16, wherein means for designing the TEQ further comprises means for using a MinISI (Minimum Inter-Symbol Interference) system.

19. The system of claim 16, wherein the eigenvector used to compute the TEQ filter coefficients does not correspond to a maximum eigenvalue.

20. The system of claim 16, wherein means for selecting the eigenvector comprises means for maximizing the achievable bitrate over a subspace of eigenvectors.

21. The system of claim 20, wherein the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of eigenvalues that are comparable in magnitude to a maximum eigenvalue.

22. The system of claim 15, wherein the TEQ design is used in a multiline communications system having multiple twisted copper pairs as a single multiline communications channel, and physical-layer signals coordinated across multiple transmitters and/or across multiple receivers for the purpose of minimizing interference noise from external sources, such as crosstalk noise from other high-bitrate services operating in a common binder or adjacent binders.

23. The system of claim 20, wherein means for designing the TEQ comprises
means for selecting an eigenvector with a subspace-based design system; and
means for computing TEQ filter coefficients with the eigenvector.

24. The system of claim 22, wherein designing the TEQ further comprises means for using a MSSNR (Maximum Shortening Signal-to-Noise Ratio) system.

25. The system of claim 22, wherein means for designing the TEQ further comprises means for using a MinISI (Minimum Inter-Symbol Interference) system.

26. The system of claim 22, wherein the eigenvector used to compute the TEQ filter coefficients does not correspond to a maximum eigenvalue.

27. The system of claim 22 wherein means for selecting the eigenvector comprises means for maximizing the achievable bitrate over a subspace of eigenvectors.

28. The system of claim 27, wherein the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of eigenvalues that are comparable in magnitude to a maximum eigenvalue.

29. A computer readable medium, having stored thereon computer-readable instructions, which when executed in a computer system, cause the computer system to:

design a TEQ (Time EQualizer) in a DMT (Discrete Multi-Tone) system to improve throughput performance; and

reduce the number and severity of notches that the TEQ introduces in a transfer function of a shortened main channel in the DMT system.

30. The computer readable medium of claim 29, further having stored thereon computer-readable instructions, which when executed in the computer system to design the TEQ, cause the computer system to

select an eigenvector with a subspace-based design computer readable medium; and

compute TEQ filter coefficients with the eigenvector.

31. The computer readable medium of claim 30, further having stored thereon computer-readable instructions, which when executed in the computer system to design the TEQ, cause the computer system to use a MSSNR (Maximum Shortening Signal-to-Noise Ratio) computer readable medium.

32. The computer readable medium of claim 30, further having stored thereon computer-readable instructions, which when executed in the computer system to design the TEQ, cause the computer system to use a MinISI (Minimum Inter-Symbol Interference) computer readable medium.

33. The computer readable medium of claim 30, wherein the eigenvector used to compute the TEQ filter coefficients does not correspond to a maximum eigenvalue.

34. The computer readable medium of claim 30, further having stored thereon computer-readable instructions, which when executed in the computer system to select

the eigenvector, cause the computer system to maximize the achievable bitrate over a subspace of eigenvectors.

35. The computer readable medium of claim 34, wherein the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of eigenvalues that is comparable in magnitude to a maximum eigenvalue.

36. The computer readable medium of claim 29, wherein the TEQ design is used in a multiline communications system having multiple twisted copper pairs as a single multiline communications channel, and physical-layer signals coordinated across multiple transmitters and/or across multiple receivers for the purpose of minimizing interference noise from external sources, such as crosstalk noise from other high-bitrate services operating in a common binder or adjacent binders.

37. The computer readable medium of claim 36, further having stored thereon computer-readable instructions, which when executed in the computer system to design the TEQ, cause the computer system to

select an eigenvector with a subspace-based design computer readable medium; and

compute TEQ filter coefficients with the eigenvector.

38. The computer readable medium of claim 36, further having stored thereon computer-readable instructions, which when executed in the computer system to design the TEQ, cause the computer system to use a MSSNR (Maximum Shortening Signal-to-Noise Ratio) computer readable medium.

39. The computer readable medium of claim 36, further having stored thereon computer-readable instructions, which when executed in the computer system to design the TEQ, cause the computer system to use a MinISI (Minimum Inter-Symbol Interference) computer readable medium.

40. The computer readable medium of claim 36, wherein the eigenvector used to compute the TEQ filter coefficients does not correspond to a maximum eigenvalue.

41. The computer readable medium of claim 36, further having stored thereon computer-readable instructions, which when executed in the computer system to select the eigenvector, cause the computer system to maximize the achievable bitrate over a subspace of eigenvectors.

42. The computer readable medium of claim 41, wherein the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of eigenvalues that are comparable in magnitude to a maximum eigenvalue.